Canadian Museum of Nature
Musée canadien de la nature

BIOME

A publication of the Canadian Museum of Nature

Vol. 11:2 | 1991 | ISSN 0712-9319

The Making of Dinomagica

Close your eyes and imagine if...

Dinomagica. It's a word we coined to describe the Museum's newest special exhibit. We tried Dino Show and Dinosaur Days along with about two dozen other titles. But when we asked visitors, they preferred *Dinomagica*. It's a good choice. After all, what would you call an exhibit that bills itself as a magical exploration into ideas about dinosaurs?

Choosing a title is only one of the challenges involved in creating an exhibit. A good exhibit appeals to your heart as well as your head. It reaches beyond words, specimens, photographs and audio-visuals. It gets you involved with interactive, hands-on experiences that let you explore, participate and have fun. It creates an atmosphere that invites you to become part of the exhibit. *Dinomagica* does just that. It features a variety of things to see and do, including 18 gigantic robotic dinosaur models, real dinosaur fossils and touchscreen computer games.

At the Museum, exhibits are produced by teams. That's because an exhibit takes a lot of hard work by a lot of dedicated people. Depending on what's involved, an exhibit can take anywhere from several months to several years to produce.

Dinomagica took nine months and about 40 people to plan, develop, design, fabricate and install.

Who are the people behind the scenes? A core project team makes sure that every aspect of the exhibit succeeds: an exhibit developer researches the subject and media and writes exhibit text; an exhibit explainer develops and presents programmes to visitors; exhibit designers design the space and the three-dimensional exhibit structures including props and lighting; graphic designers design everything you read such as posters, panels and electronic media; a scientist advises on specimens and ensures the accuracy of information; a marketing representative advises on marketing opportunities; and the project leader leads and co-ordinates the team, pulling everything together.

Every exhibit reflects the innovation, creativity, energy and expertise of those who work on it. The best exhibits are produced by a group whose members respect each other's role and abilities. The idea is to bring out the best in every member so that their work produces a high-quality exhibit that reflects the dynamics and synergy of the group. Each team approaches the task in its own way. As anyone who has ever worked or played on a team knows, there are both frustrating and fulfilling moments. The end result is always worth the effort.

Although the core team determines the direction of the exhibit, it can't take credit for the whole thing. The Museum has a host of other fine contributors responsible for audio-visual and electronics development, fabrication of exhibit components, model-making, installation and upkeep. An exhibit also needs scientific support, administrative support, library services, architectural services, security, school programmes, marketing, media relations, fundraising and volunteer recruitment.

It adds up to a lot of people! The most important of which is our visitor. Throughout the process each team member must represent the Museum visitor. To do this effectively we rely not only on our instincts and experience, but also on visitor evaluations. We informally observe the way visitors interact with existing exhibits. We listen to your questions and comments on the subject. Questions like, "How do scientists fit the bones together?", "What year did dinosaurs die?", and "Are those real?" give us information about perception, subject interest and knowledge.

Museums are places that encourage social interaction, so a lot of information is passed on informally through conversations. One father was overheard giving the following explanation to his son: "The big mean one is going to eat the little ones," he said. "NO, dad," said the child in a loud voice, "he's not a meat-eater." The dinosaur audience is very sophisticated! The kids thrive on instructing the adults on everything from dinosaur behaviour to the proper pronunciation of the Latin names.

Visitors challenge us to find effective ways of communicating. Each exhibit must meet its goals and objectives within a given time using available resources. Creativity and innovation are essential, but efficiency and economics are also important. For example, a home renovation designed to meet the needs of several people might cost about $1200 a square metre. *Dinomagica* costs about half that and must meet the needs of our anticipated 200,000 visitors!

With information about our subject and our visitors, we can take the original ideas about the exhibit and translate them into a clear message. The planning phase of the exhibit can then begin and the concept can be developed.

Dinomagica explores ideas about dinosaurs and the way they are discovered and studied. It focuses on finding fossils in the field, taking a closer look in the lab, and building dinosaurs to bring them back to life in the Museum.

Other museums have placed the large robotic beasts in prehistoric settings and asked you to go back in time. This perpetuates a myth, leaving little to your imagination by giving you a complete, but contrived recreation of the past. We took a different tack. We chose to appeal to your imagination by asking: "What if dinosaurs came back?" *Dinomagica* features famous faces in familiar places. The fact and the fiction are easier to tell apart and the approach is fun, not frightening.

From planning to product: budgets, target dates, goals, objectives and design criteria were specified. Research was done, a thematic outline was developed and potential display materials identified. The team produced draft text and scripts, specimen and object lists, floorplans, a graphic approach, and preliminary sketches and illustrations. These allowed us to visualize the end product. We asked you to test run the text and we made cardboard prototypes and mock-ups of graphic and exhibit components to identify any potential problems in the early stages. The exhibit really began to take shape, growing and evolving as more information became available. We adjusted, improved and polished. Finally, it all came together and the planning and design phases made way for construction drawings and actual production.

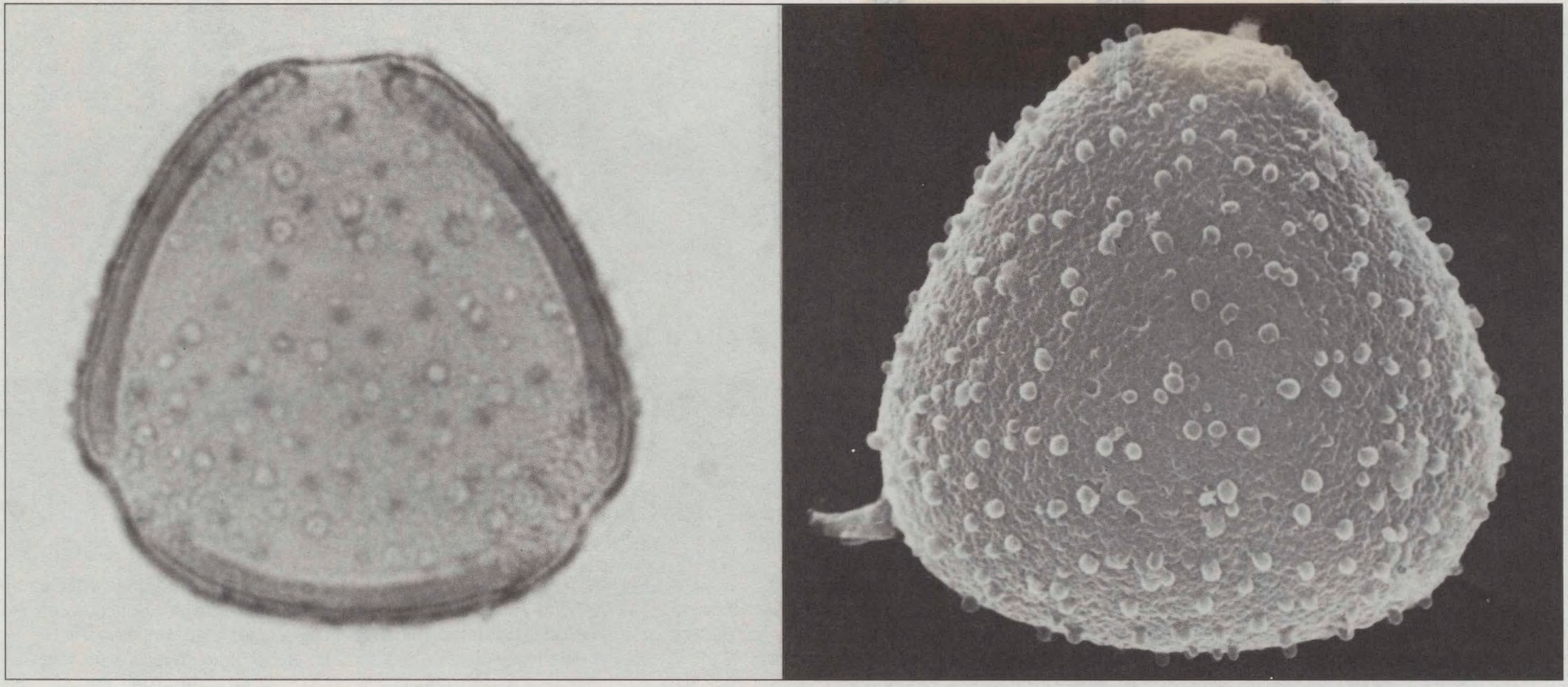
The saw blades buzzed. The cameras clicked. The computers whirred. Someone tracked down plastic sausages, assorted football gear, theatre costumes, hydro poles and half a dozen shopping carts. At last, we were ready to face the audience, catch our breath and then begin again. That's the nature of exhibit making.

Dinomagica runs until September 15, 1991. Admission is $7 for adults and $3 for children aged 6 to 16. Children under six are admitted free. For more information, please call (613) 996-3102.

Carol Campbell
Local Programmes Division

Editor's note: the photograph for the "dinosaur in traffic" composite is reproduced courtesy of the National Capital Commission. The dinosaur illustration is adapted from "The Illustrated Encyclopedia of Dinosaurs," Crown Publishers, 201 East 50th Street, New York, NY 10022, USA © Salamander Books.

...dinosaurs came back to life in Ottawa!



D.M. Jarzen

Pollen grains of the Protea family, photographed with light microscopy (left) and scanning electron microscopy (right), both photographs enlarged to about 1200 times. Note the three-dimensional aspect of the SEM photograph.

The SEM

The scanning electron microscope (SEM) is a sophisticated electronic machine that can magnify objects beyond the normal range of ordinary compound microscopes. The microscope has remarkable clarity and an almost three-dimensional reproduction.

S.A. Jarzen

Researcher at a modern-day SEM. This instrument is used at the Canadian Conservation Institute, Ottawa.

In 1965, when the first SEM came on the market, scientists considered it a super-microscope. Its cousin, the light microscope, focuses a beam of light *through* a specimen and magnifies the image with a series of lenses, achieving magnification up to 1500 times. However, the SEM focuses an electron beam *on* a specimen and magnifies the "electron image" magnetically, achieving continuously variable magnification from about 20 times to 40,000 times.

Today, SEMs operate more simply, allowing the operator improved observation and photography of microscopic structures. Most organisms inhabiting our world are microscopic: bacteria, yeasts and other fungi, phytoplankton and zooplankton. Many other organisms produce morphologically important structures or organs that are adequately observed only through a microscope: pollen, spores, hairs, plant and animal tissues and fish scales. Thus, SEMs are an ideal tool for many natural scientists.

At the Canadian Museum of Nature, one of the many uses of SEMs involves the study of microstructures on the wall of pollen grains. These structures are often smaller than one micron (a micron equals 1/1000 of a millimetre) and are just barely discernible with a light microscope. However, with the SEM they become three-dimensional objects that can be measured and described (see photograph).

The identification of fossil pollen has proved useful in determining the parent plants that produced the pollen grains. Often, a pollen type can act as a plant's "fingerprint," as many plants produce pollen forms and architecture unique to that plant. In the identification of Cretaceous fossil pollen (about 70 million years old), several forms are found that are similar to pollen forms of living plants. The SEM can highlight details that are not observable through light microscopy, and are often sufficient to properly identify the fossil as sharing an affinity with an extant (living) form. When the parent plant is identified, reconstructing the vegetation and surrounding environment follows. This gives the researcher a picture of how our world may have appeared in the past.

With improved techniques in microscopy and an increase in the use of SEMs as a research tool, new vistas in understanding our natural world are no doubt "right before our very eyes."

David M. Jarzen
Paleobiology Division

From the Director's Desk:

What is Real, What Unique?

Consider a work of art. One person made it, and each other piece of art is different and therefore unique. Art museums collect works of art, preserve them, and offer them on view to the visiting public. If a reproduction of the art is presented, is it a real piece of art anymore? Is it unique? History museums collect material evidence of civilizations. These archaeological objects are also thought of as unique — made by a single person or group of people, and not repeated identically. The artifacts often symbolize aspects of life or stages in the evolution of society. Yet throughout history, it is the similarity of objects that characterize one society and differentiate it from another. On display, the objects have often been reconstructed, repaired, and filled with modern plastics. Are they still real? Were they ever unique?

In a nature museum, specimens from nature include minerals, plants, and animals. If the intention is to have a specimen of a common street pigeon, is there any difference between one specimen and another? Do these differences make each specimen unique? Certainly the pigeon would have an opinion if given the choice of which pigeon to kill for a display! And what about the display? Usually the skin and feathers remain, but the internal organs and skeleton have been replaced with wire and excelsior. Indeed, I know of one excellent "specimen" on display of a baby chimpanzee that is entirely fabricated from the fur of a bear killed at a garbage dump. Many of the major dinosaurs on display in the museums of North America are made of plastic. Do they satisfy the museum criterion of "real" or "unique?"

The reason for all this artifice is to prevent gradual destruction of the object, artifact, or specimen due to constant exposure to light, changes in temperature, humidity, or handling. If it is destroyed, the museum has failed to preserve those symbols of our identity. Why not just go out and collect another one if the first is destroyed? One cannot just ask Monet to paint another picture, or ask the ancient Minoans to build another magnificent vase. Those people are gone. We must not make a mistake, it is just as impossible to collect another specimen of butterfly or squirrel from one hundred or one thousand years ago. Animals and plants, like you and I, are individually unique creations, just as is a painting or vase. Certainly, the workmanship in nature is far superior, and most of the design and imagery in human-created objects are drawn from nature. A nature museum, and all of humankind, should treasure the natural objects as they would treasure any other work of art. What matters is that we understand and appreciate them for what they are. We must respect them for the part they have played in the past, the present, and one fervently hopes, the part they can play in our collective future.

Alan R. Emery
Director

BIOME

Editor-in-Chief:
Nick Bélanger

Acknowledgements:
Norman Bloom

Graphic Design:
Acart Graphic Services Inc.

Illustrations:
Bonnie Dalzell
Charles Douglas
Ed Hendrycks
Don MacMillan

Cette publication est également offerte en français

Comments and questions should be directed to:

BIOME
Canadian Museum of Nature
P.O. Box 3443
Station D
Ottawa, Ontario
K1P 6P4

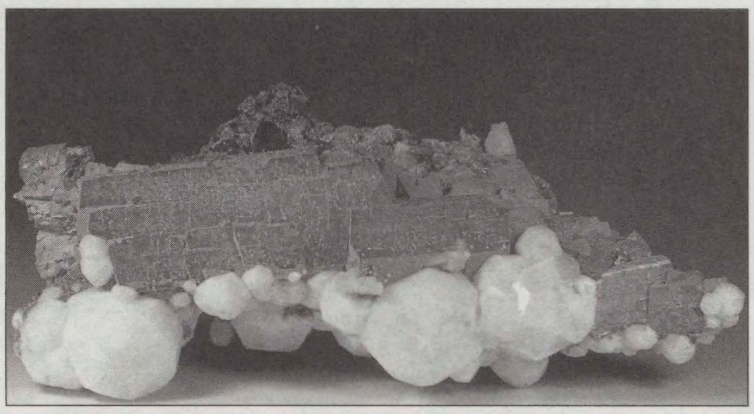
Biome is printed on recycled paper

The Treasures of Mont Saint-Hilaire, Québec

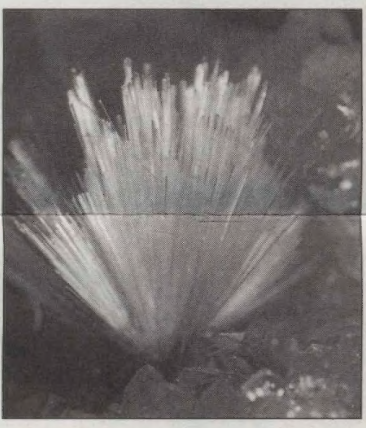
Anyone who has driven along the Trans-Canada Highway between Montreal and Québec City has likely noticed a series of prominent hills that rise abruptly out of the surrounding flat farmland of the St. Lawrence Valley. These hills look strangely out of place — as if they don't belong in the surrounding geographical terrain. Roughly circular, one might think they are the cores of ancient volcanoes. The hills are indeed igneous bodies which rose from the earth's mantle and intruded the flat-lying sedimentary rocks as molten magma. But, while some volcanic activity may have been associated with this movement, most of the intrusions were probably emplaced several kilometres below the surface.

The igneous rocks of these hills are much harder than the sedimentary host rocks, and over millions of years of weathering now stand out in relief. This collection of hills (Mont Royal in Montreal is one of them) are genetically related to one another and together are called the Monteregian Hills. There are 10 such hills, from Oka in the west to Megantic in the east. This article looks at one of these hills: Mont Saint-Hilaire.

Mont Saint-Hilaire is about 40 km east of Montreal and is clearly visible from the Trans-Canada Highway (Québec Route 20). The mountain rises 350 m above the lowlands and is roughly circular with a diameter of about 3 km.


G. Robinson

A large serandite crystal on a group of analcime crystals. The specimen is 22.5 cm in length.


R. Gault

A radiating spray of lorenzenite crystals, 4 mm in height.

In the past 25 years, Mont Saint-Hilaire has become known internationally as one of the great mineral localities of the world. Several Canadian institutions, including the Canadian Museum of Nature, Carleton University, the Royal Ontario Museum and École Polytechnique, have devoted much of their geological research resources to studying the complex mineralogy of the site. What makes this mountain so unique? Why has it drawn scientists and mineral collectors from around the world to its cliffs and quarries? The answers lie in the complex and unusual chemistry of the magma, which intruded this area about 125 million years ago (Cretaceous Period). The molten rock, when it finally cooled and crystallized, created a suite of rare and exotic minerals, many of which are found nowhere else. To date, 262 different mineral species have been identified from Mont Saint-Hilaire. No other place on earth contains this concentration of different species in such a small volume of rock. Fortunately for scientists who are studying the mineralogy of this site, quarrying operations on the northeast face of the mountain continuously expose new discoveries.


G. Robinson

A sphere of leifite crystals, 3.5 cm in diameter, with serandite.

The minerals are often found as exquisitely crystallized specimens in cavities in the rock. These cavities, or vugs as they are known to geologists, range in size from a few millimetres to several metres across. Some vugs, such as those found in the cores of the pegmatite veins, are large enough to crawl into. A pegmatite is a coarse-grained vein or dyke-like body and is generally the last part of the magma to crystallize. Superb crystals of such rare species as serandite, catapleiite, leucophanite and analcime are often found lining the walls of these cavities. Many crystals are the finest examples of their species ever discovered. In some cases where the cavities are large enough and there is enough material available, large crystals have formed, some 30 cm or more in length.

Dynamic forces were in effect while this intrusion was forming. Rock fragments were broken from the walls of the host rocks as the intrusion pushed into them. These fragments combined with the rising magma and eventually formed a rock called breccia. In the small cavities between the fragments tiny, exquisite crystals formed. These micro-crystals, when viewed under the stereomicroscope, demonstrate nature's talent for creating specimens of great beauty and perfection of form and symmetry. The intrusion also ripped off large blocks of the basement rock and incorporated these into the rising magma. Most obvious of these are the large blocks of white marble that are exposed in the walls of the quarries. Many different minerals, including beautiful blue crystals of the mineral carletonite, are found in this rock. Carletonite is a new mineral that was first discovered at Mont Saint-Hilaire and named after Carleton University, where much of the research work on Mont Saint-Hilaire minerals has been done. Mont Saint-Hilaire remains the only known locality for this mineral. In addition to carletonite, 20 other minerals were first discovered and described from Mont Saint-Hilaire.


G. Robinson

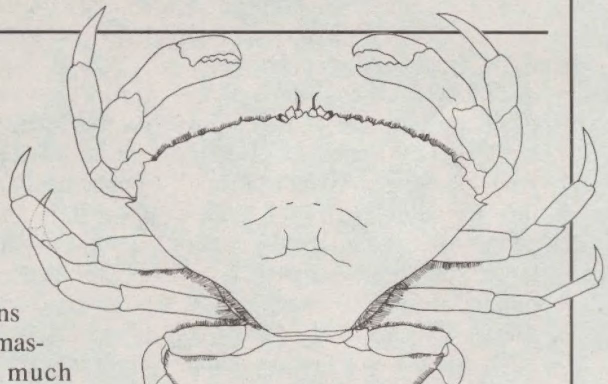
An aggregate of bladed serandite crystals, 11 cm in height.

The work continues. Scientists are now working on about 40 unidentified species, some that could be new species. No one knows what splendid discoveries are yet to be made.

A section of the new mineral gallery now being developed by the Canadian Museum of Nature will focus on this unusual site. It will soon allow the Museum to exhibit the magnificent treasures from Mont Saint-Hilaire it holds in its collections.

Robert Gault
Mineral Sciences Division

Neotoma is 29!



Well, not 29 years old, but issue 29 in the *Neotoma* series is now available — as well as issues 30 and 31.

In issue 29, *North American Short-Faced Bears*, readers may learn about the largest land carnivores that lived in North America during the ice age. Some stood about 3.4 m high when up on their hind legs. They could have had a vertical reach of more than 4.3 m — about 1.2 m above a basketball hoop!

Some crustaceans are also relatively massive, although much smaller than short-faced bears! The Tasmanian Giant crab weighs more than 14 kg and has a shell 40 cm wide. On the other hand, some copepods are the size of the period at the end of this sentence. Find out more about these fascinating members of the animal kingdom in issue 30, *Crustaceans: Insects of the Sea.*

Where do Canada's birds come from? If you want to know, read issue 31, *The Origins and Diversity of Birds in Canada.* Learn how Canadian birds, through natural evolution and other causes, have undergone some important changes to achieve their present status. Also learn how to classify them in major groups according to their evolutionary origins.

Call or write to the Museum Resource Centre for your free copies of these new *Neotoma* issues. A list of other free materials is also available on request.

A National Centre for Rare and Endangered Plant Documentation

Most plants now found throughout Canada are relatively recent immigrants. The various forests and other associations of plants that make up the different habitats of our landscape were formed mainly during the last 10,000 years. Following the warming of climate and the melting of the glaciers that covered nearly all of Canada, plants migrated from areas to the south and from ice-free areas in the Yukon and parts of the western Arctic to recolonize the bare landscape.

In spite of Canada's vast size, its flora is relatively small. Only about 3300 native species of vascular plants (flowering plants, conifers, and ferns and their allies) and about another 900 species introduced from other parts of the world during historical times have been documented. However, in less than 300 years of European settlement in the New World, many plants of forests, wetlands, prairies and other habitats, especially in the more southern areas most favourable to human habitation, have become reduced to such low numbers that their continued existence in Canada is endangered.

The Museum is Canada's national centre for information on natural history and the official repository for specimens of plants, animals and minerals. The Museum has more than six million in its research collections, with more than 550,000 mounted sheets of vascular plants. Together with the algae, lichens and mosses, the collections at the Botany Division number more than 900,000 specimens. These plant collections and those of other institutions across Canada document Canada's natural plant heritage.

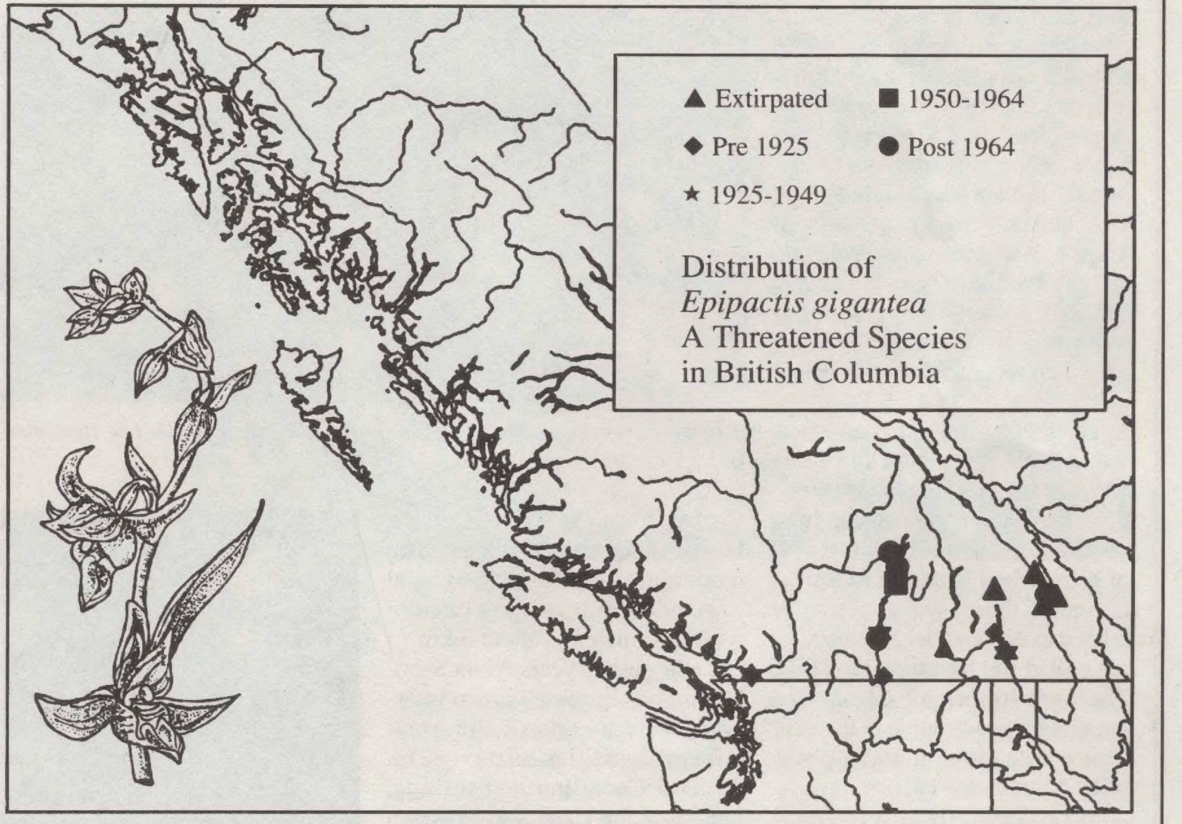
The Museum's Rare Plant Project, under the leadership of Dr. George Argus of the Botany Division, has published listings of rare vascular plants for almost every province and territory in collaboration with botanists at various institutions across Canada. The last list, that for the Northwest Territories, is now in preparation.

In addition to these publications, a national list of rare vascular plants has just been published by the Museum (Argus and Pryer, 1990, *Rare Vascular Plants in Canada: Our Natural Heritage*). This national "red data book" updates past work and provides provincial and national priority rankings that are useful for conservation managers. With this list it is possible to decide which species and habitats have the highest priority for management action. The national list includes more than 1000 species of rare plants, which represents almost one-third of the native vascular plants in Canada.

For some years now much of the basic information about the Museum's plant and animal collections — the names of the species, where they were collected, by whom, when and in what habitats — have been entered into the Museum's main computer databank. This databank of Canada's biological diversity is the largest in the nation. Vascular plants are the largest group of organisms represented in this databank, with more than 207,000 records.

This valuable databank will form an integral part of the Botany Division's new computer mapping project that will focus on Canadian plants at risk. Traditionally, distribution maps that show where a plant (or animal) occurs have been produced manually by placing symbols on a pre-printed base map. Affordable and powerful personal computers have given scientists new ways of visualizing and recording graphic information (drawings and pictures) that previously could be done only on large mainframe computers.

A wide range of geographic information systems (GIS) and database management programmes are now available. They allow museum scientists to manipulate their data and display it automatically. The Botany Division has decided on a relatively inexpensive Canadian-developed mapping system, a mini GIS called "inFOcus-QUIKMap." By using



the geographic coordinates of the localities where the plants were found, the mapping system allows us to overlay our computer specimen data as coloured symbols on a map of Canada (or the world). Distribution maps can be printed automatically and sent to agencies requesting information on rare species, or can be used for scientific or conservation-related publications. By overlaying records of many rare and endangered species at the same time, we can see on the computer screen or on the printed map, clusters of symbols that represent areas (habitats) that have concentrations of species that may be at risk. With this information, we can alert provincial authorities of the occurrence of these high-priority habitats under their jurisdiction. Measures can then be taken to protect them and their species.

The data records used with this mapping system will be drawn from the Museum's main databank. At the same time, a new database is being developed that deals only with rare Canadian plants. This new database will be used to produce an atlas of rare plants in Canada. As a starting point for this database, we will enter data on species that are candidates for status report preparation or have already had status designated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). This is a convenient starting point, because the species treated by COSEWIC tend to be those in greatest need of conservation. COSEWIC is a national organization of provincial wildlife managers, federal departments and national conservation agencies, of which the Museum is a member. Depending on the degree of jeopardy, COSEWIC designates wildlife as vulnerable, threatened, endangered or extirpated (no longer found in Canada).

Since the COSEWIC Subcommittee for Plants was set up in 1979, preparing plant status reports has been under the direction of the vascular plant section of the Museum. To date, 64 rare Canadian plants have been assigned status (2 extirpated, 19 endangered, 22 threatened, and 21 vulnerable). With a list of more than 300 plant candidate species still left for status report preparation (at a cost of $2000 each) and with limited funds available, completing status reports for all candidates in the near future seems unlikely.

In spite of support for COSEWIC status report preparation from federal agencies, provincial governments, and World Wildlife Fund Canada, wildlife conservation will be most effective if we ensure that critical habitats for rare species are protected. Although many species may still have to be considered individually, the focus of our efforts to conserve Canadian plants at risk will have to be directed at saving wildlife habitats. By changing our focus from individual species to habitats, associated plants, animals and microbes that share a common home will have a better chance of surviving the critical decades ahead.

Erich Haber
Botany Division

New Magazine Celebrates Canada's Biodiversity

Many individuals and organizations in Canada are busy trying to save the planet's natural wealth in species. Canada's biodiversity is endangered by the destruction of forests, grasslands, freshwater and marine habitats, and by burgeoning human populations. A new bulletin, *Canadian Biodiversity*, helps link governments, environmental organizations, industries and universities so they can share knowledge of problems and solutions and air their different opinions. The first issue of *Canadian Biodiversity* and the French edition, *Bulletin canadien de la biodiversité*, has recently been published by the Canadian Museum of Nature.

Canadian Biodiversity communicates world news to Canada and Canadian news to the world. The first issue has articles on the meaning of biodiversity; the moral and practical reasons for saving our biodiversity; the bird diversity of French Guyana; maps of Canada's tree diversity, which so many other life forms depend on; a new geographic information system (GIS) for recording wildlife diversity; information on Canadian, American and international efforts to save species from extinction; and meetings and new books on biodiversity.

The first issue is printed on recycled green tinted paper with black and green inks. Attractive black and green illustrations adorn the text. The bulletin explains biodiversity in clear, non-technical language, to cut across disciplines and to speak to both specialists and the public. Most people with a high school or university background will find it readable and eye-opening.

Knowledge of biodiversity is essential if we want to save life forms that share the planet with us. These life forms help sustain the oxygen in the air, the quality of our soils and waters, and provide us with food, building materials and thousands of other resources. Dr. Don E. McAllister, the scientific editor of *Canadian Biodiversity*, says, "Our survival and the quality of our lives depend on knowledge of biodiversity."

Canadian Biodiversity will publish articles on new discoveries about biodiversity and its conservation. Science and industry need to work together if we are to conserve and wisely develop the potential of our great natural diversity. The bulletin will publish differing and sometimes controversial views on saving our old-growth forests, the proportions of land and water that should be set aside as parks, the uses of biotechnology, and royalties or other compensations paid to first peoples and tropical countries for access to their rich biodiversity and traditional knowledge.

Canadian Biodiversity will be published quarterly. The first issue has 48 pages in the English and 52 pages in the French edition. Subscriptions are only $15 a year for individuals and $30 a year for libraries. For a subscription contact:

Canadian Centre for Biodiversity
Canadian Museum of Nature
P.O. Box 3443, Station D
Ottawa, Ontario K1P 6P4
Fax: (613) 952-9693

For more information, phone (613) 996-9606.